Oregon Pedestrian and Bicycle Safety Implementation Plan

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Outline

- Project Goals and Objectives
- Methodology
- Network Screening
- Countermeasures
- Implementation & Next Steps

Project Goals and Objectives

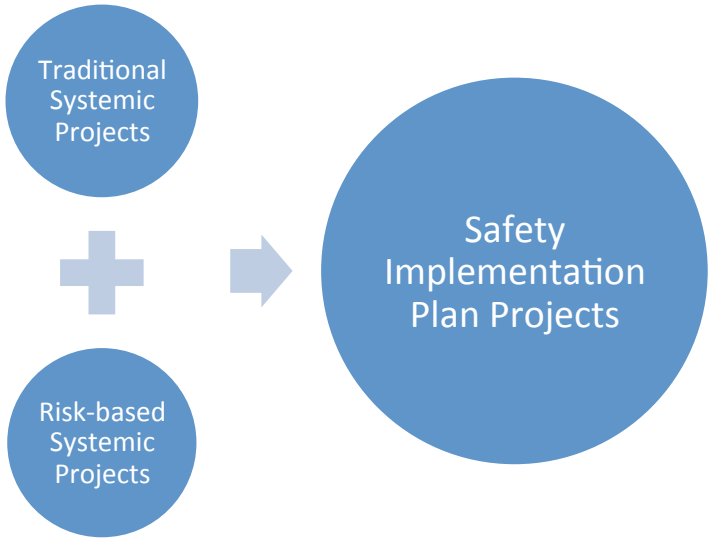
- Reduce **fatalities and severe injuries** resulting from pedestrian and bicycle crashes
- Data-**informed** approach
- **Systemic** improvements
  - Low-cost
  - Statewide, jurisdictionally blind
  - Crashes alone are not always sufficient
- Set framework for the future
  - Establish a repeatable process
  - Develop a toolbox of countermeasures
  - Identify opportunities for improvement (e.g., additional data needs)
- Develop potential sites for funding
  - $4 million Pedestrian/Bike safety funding in 2017 for all roads

Methodology

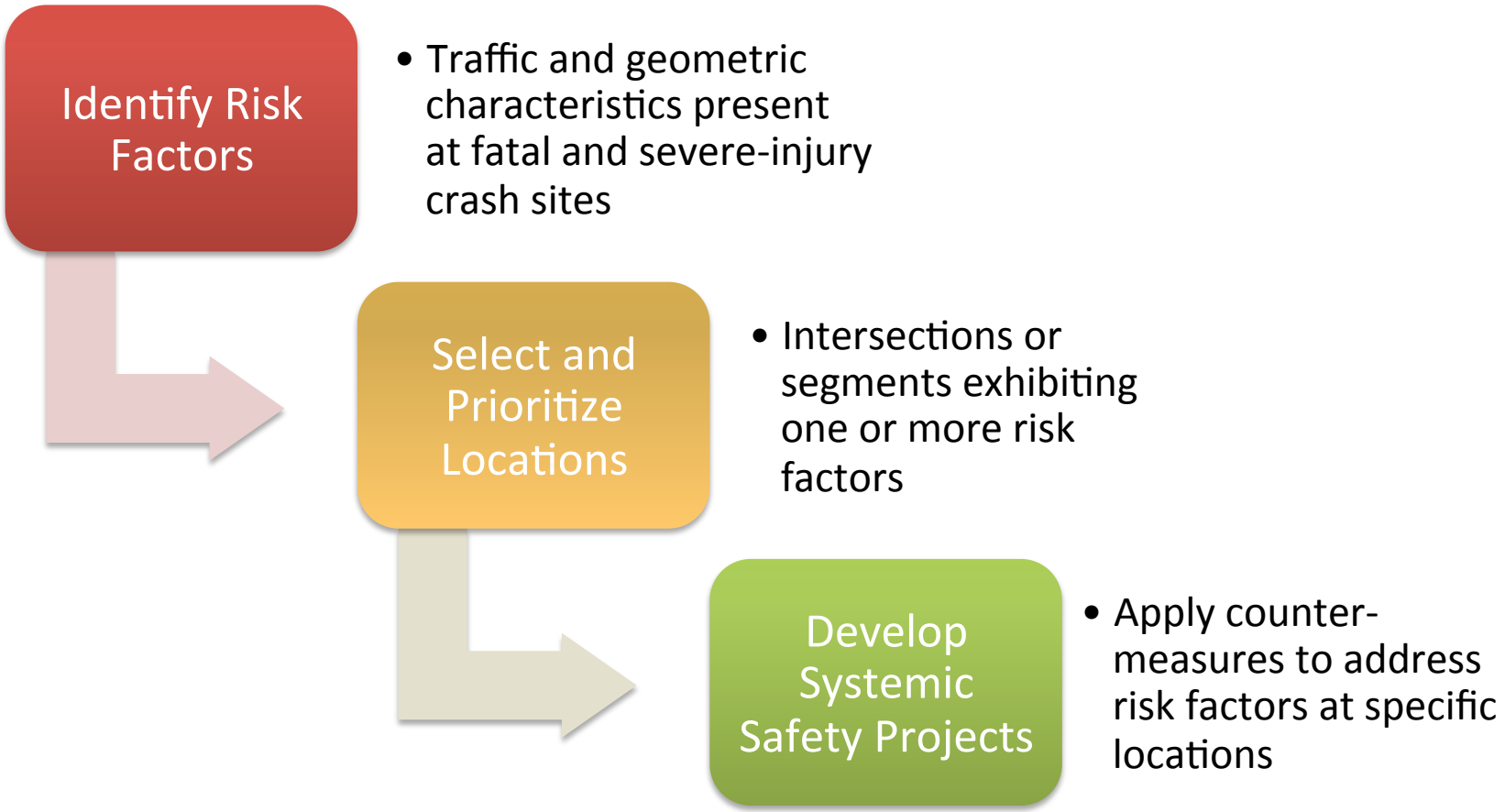
- Literature Review
  - FHWA Risk-Based Approach
  - Countermeasures
- Risk-Based Systemic Approach
  - Crash Analysis
  - Development of Risk Factors
- Stakeholder Input
- Network Screening
  - Risk-Based Approach
  - Traditional Approach
- Prioritization of Corridors

Overview of Systemic Methods

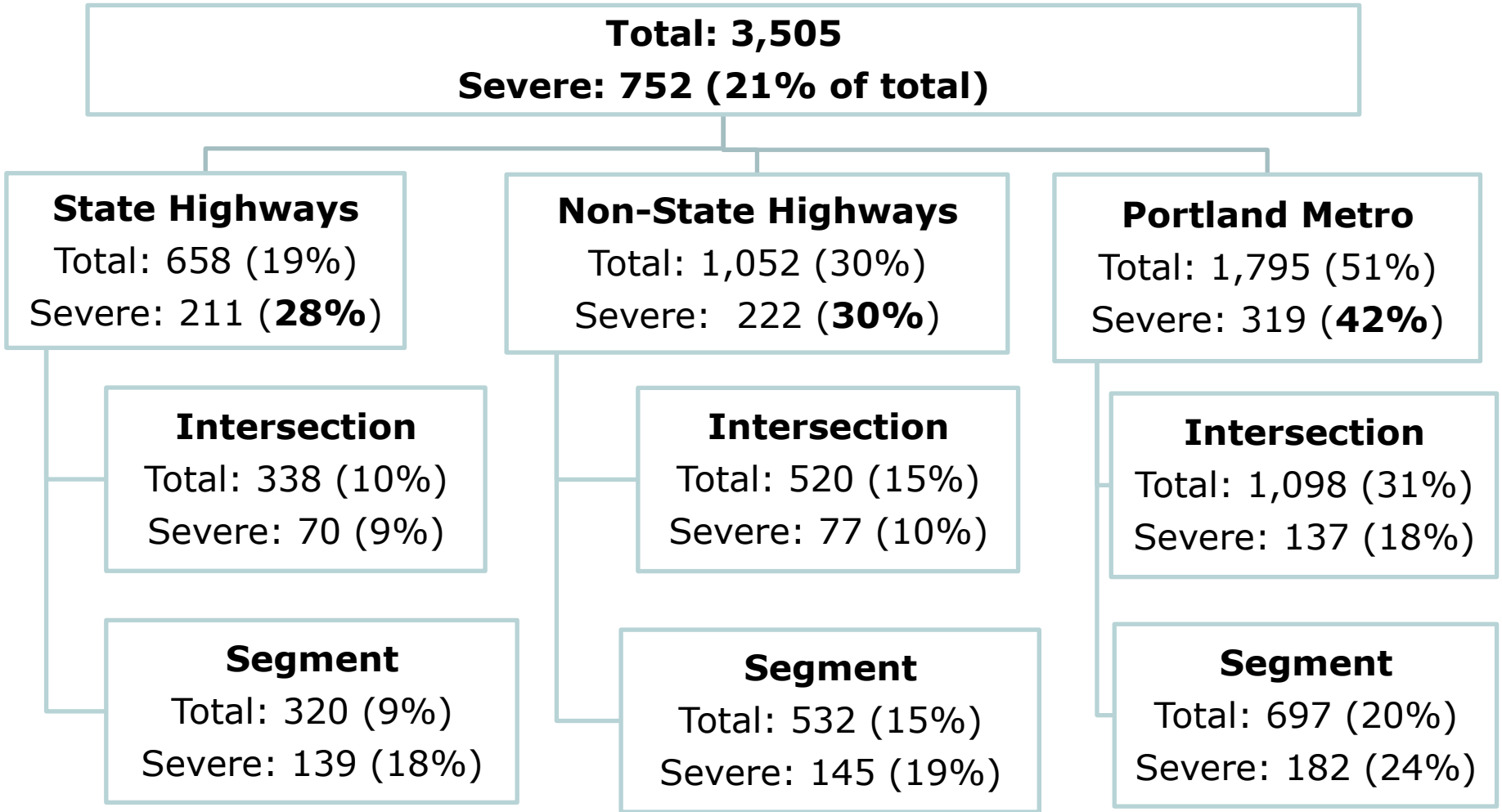
- Two systemic methods to complement each other
  1. Traditional
     1. Broad implementation of countermeasures on high-crash corridors
  2. Risk-based
     1. Identify locations with factors that increase the risk of pedestrian or bike crashes
     2. Prioritize locations based on the presence of risk-factors
     3. Implementing agency reviews sites, selects countermeasure from list



Overview of Risk-Based Systemic Method



Crash Analysis - Statewide Reported Pedestrian Crashes (2007-2011)



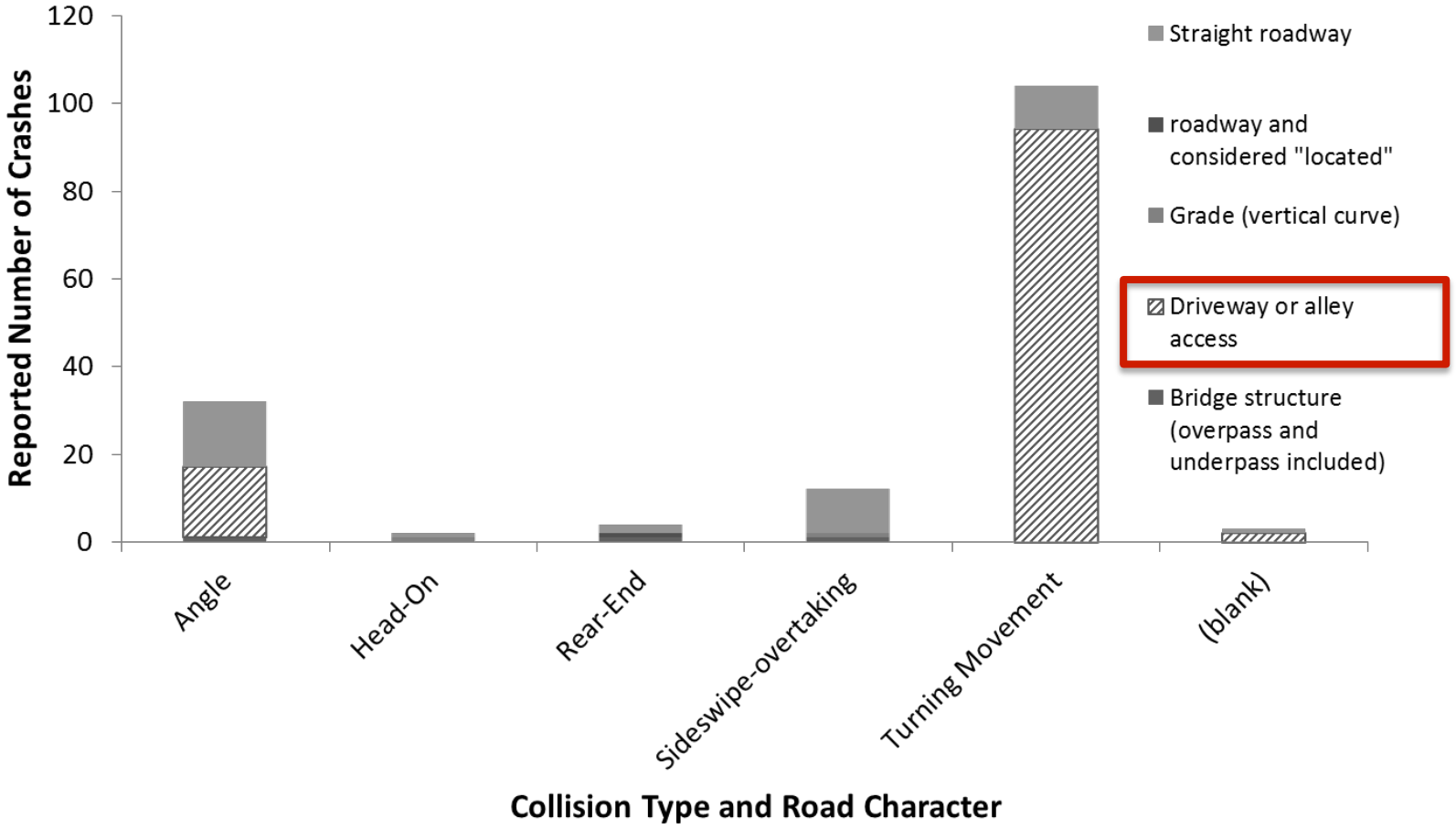
Crash Analysis – Example Pedestrian Trend

- Reported Crashes State Highway Segments in Urban Areas (2007-2011)

Identify Risk Factors → Select and Prioritize Locations → Develop Systemic Safety Projects

Crash Analysis – Example Bicycle Trend

- Reported Crashes on State Highway Segments in Urban Areas (2007-2011)



Potential Risk Factors – Pedestrians

Roadway Type	Area	Potential Risk Factors
State, Non-State, Intersection	Urban/ Suburban	☒ Signalized intersections with permitted or protected/ permitted left-turn phases
METRO, Intersection	Urban/ Suburban	☒ Signalized intersections within 100’ of transit stop ☒ Intersections that have collector or arterial roadways with 4-lanes on at least one approach
State, Intersection	Rural	☒ Intersections with approach speed limits at or above 45 mph and no sidewalks
State, Segment	Urban/ Suburban	☒ Unlit streets ☒ Signal spacing greater than x/mile ☒ Roadway cross-sections without a median ☒ No sidewalk and posted speed equal to or greater than 45 mph
State, Segment	Rural	☒ Number of liquor establishments within x feet ☒ Streets that lack street lights and have speeds above 40 mph
Non-State, Segment	Urban, Suburban and Rural	☒ Signal spacing less than x/mile

Potential Risk Factors – Bicycles

Roadway Type	Area	Potential Risk Factors
State: Intersection	Urban/ Suburban	☒ Signalized intersections with at least four lanes on major street
	Urban/ Suburban	☒ Unsignalized intersections with two or four lanes*
Non-State, METRO: Intersection	Urban/ Suburban	☒ Intersections with a bicycle facility on at least one approach
METRO: Intersection	Urban/ Suburban	☒ Signalized intersections within 100 feet of transit stops
State and Non-state: Intersection	Rural	☒ Unsignalized intersections with two-lane approaches*
All: Segment	All	☒ Driveway density (number of driveways/ mile)

Risk Factors - Pedestrians

- Due to data limitations pedestrian risk factors limited to:
  - Presence of transit stop
  - Number of travel lanes along segments
  - Presence of median on 4-lane roads
  - Posted speed along segments
  - Distance between signals or enhanced crossings (to extent that data is available)
  - Average Daily Traffic volume
  - Number of injuries resulting from a pedestrian crash (by severity)

Risk Factors - Bicycle

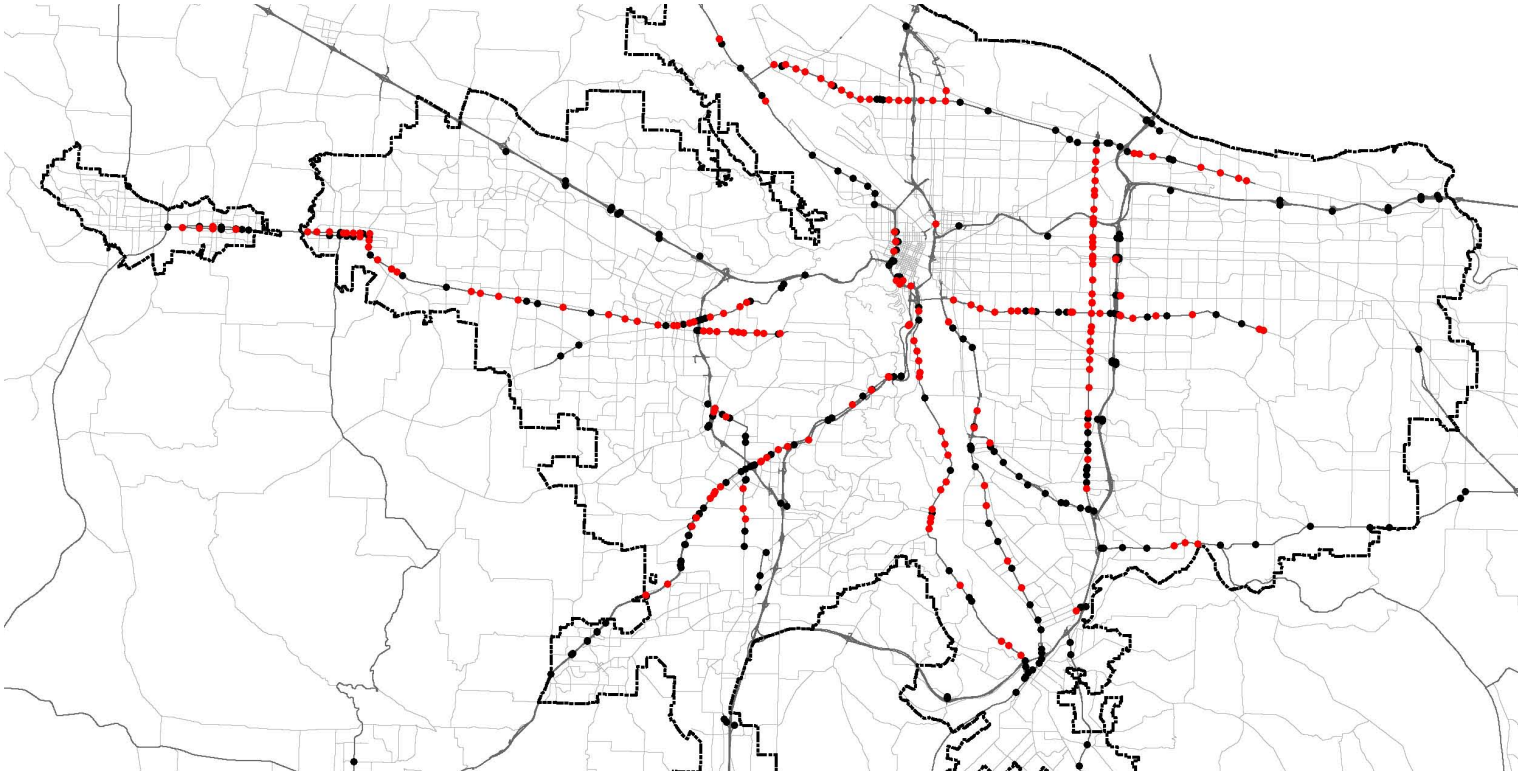
- Due to data limitations bicycle crash risk factors limited to:
  - Number of driveways
  - Number of lanes on major street at intersection
  - Lack of bicycle facility on at least one approach at intersection
  - Proximity to transit stop
  - Average Daily Traffic volume
  - Number of injuries resulting from a bicycle crash (by severity)

Network Development

- GIS data were aggregated into a linearly-referenced network
- To provide a consistent scale, the network was subdivided into 1/10th of a mile segments
- Separate networks were developed for three levels of the road system
  - Due to data limitations, networks were separated to maximize data availability where possible
  - Urban State Network (Risk-Based and Traditional)
  - Rural State Network (Traditional)
  - Non-state Network (Traditional)

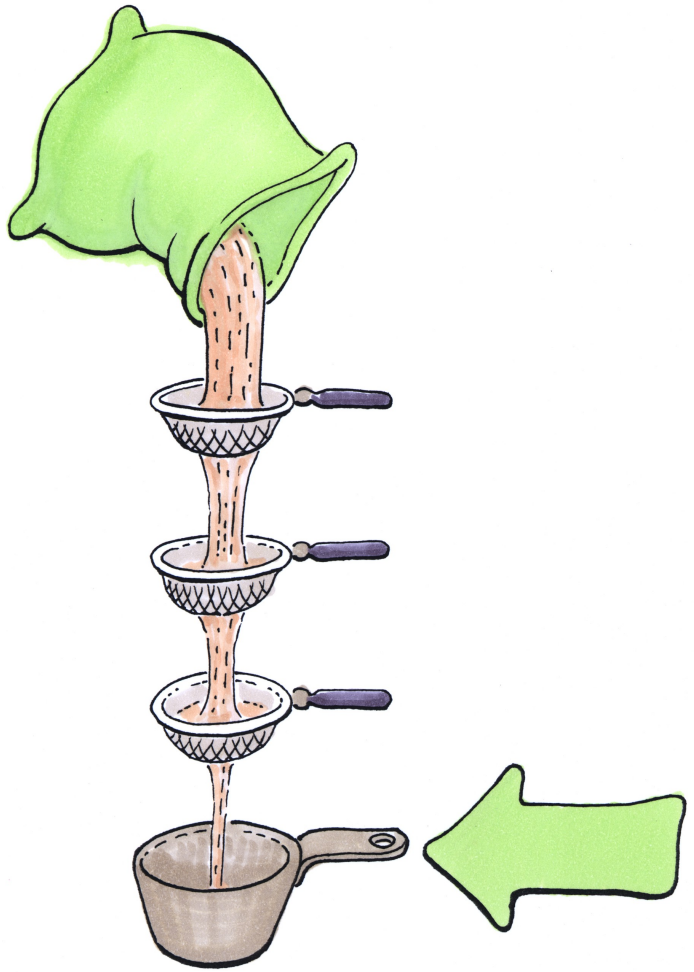
Risk-Based Network Screening

- Limited application to state highways in urban area
  - Red dots: signalized intersections within 100 feet of transit stop
  - Black dots: all other signalized intersections



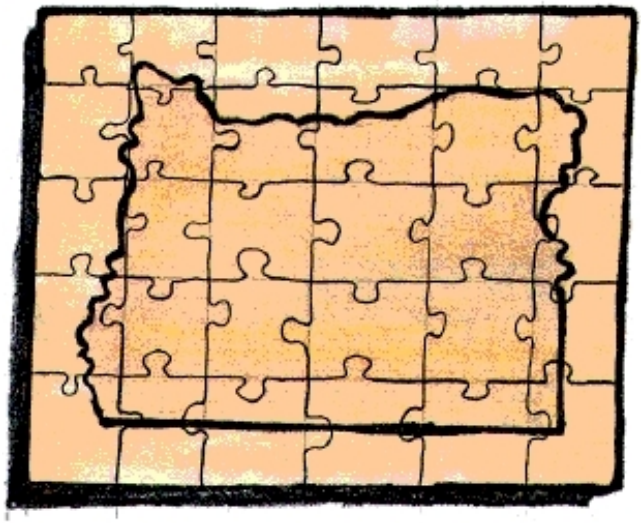
Risk-Based Site Prioritization

- Risk-based
  - Segments were scored based on the number of risk factors present
    - Some risk factors carry higher point value than others
    - Scoring based on risk factors on the segment and within ½ mile
  - Consecutive segments with high scores were aggregated into corridor projects
  - Segments/corridors with the highest scores were prioritized

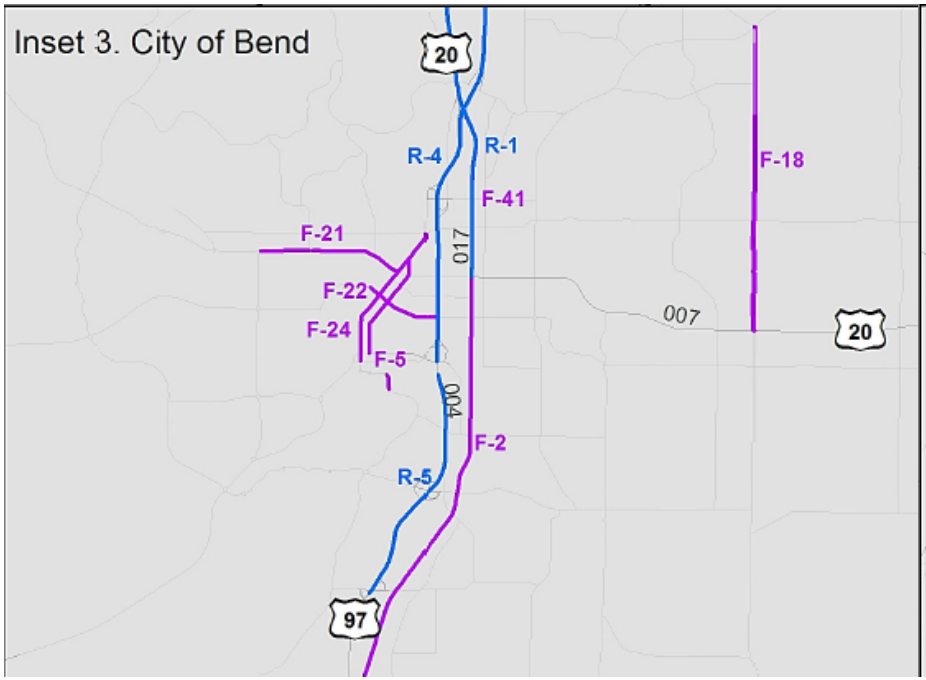


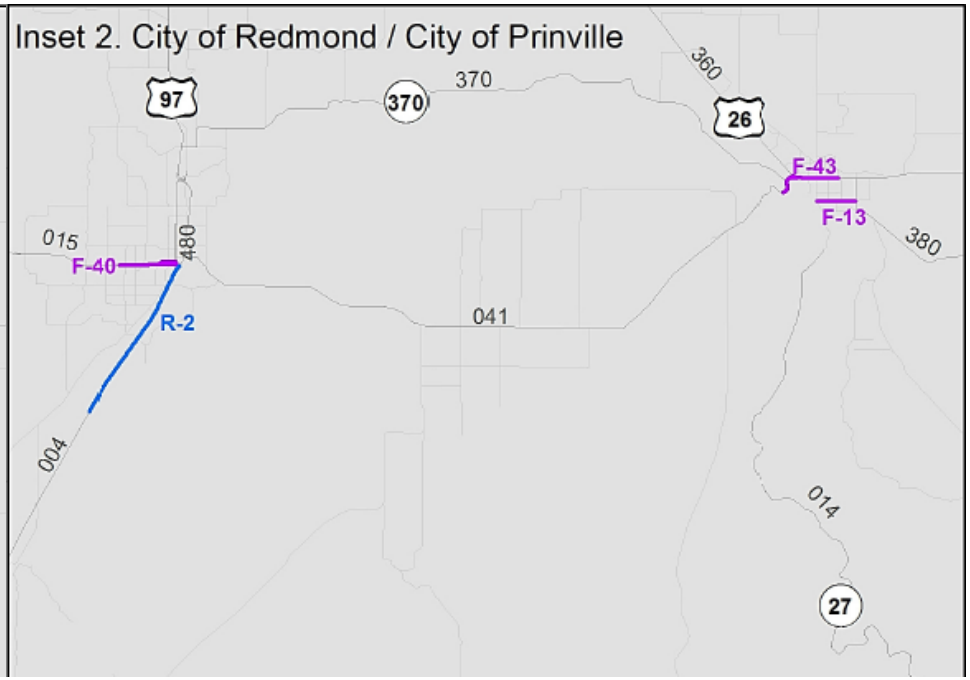
Traditional Method Site Prioritization

- Traditional
  - Identify corridors with highest frequency of severe-injury and fatal crashes for the entire state
  - Scoring based on total number of severe-injury and fatalities along the segment and within ½ mile
  - Segments were then aggregated into corridors based on proximity and prioritized by overall score



Prioritized Corridors – Region 4 Pedestrian Example





Systemic Countermeasures

- Countermeasures evaluated based on
  - Documented effectiveness
  - Ease of implementation
  - Relative cost
- Prioritized countermeasure toolbox developed with input from stakeholder workshop and project management team
- Used to develop potential safety improvement projects

Example Countermeasures – Pedestrian

Crash Countermeasures by Area Type and Traffic Control	Relative Construction Cost	Relative Ease of Implementation	Countermeasure Effectiveness*	Relative Reliability of CMF
All Locations				
Signalized				
Lighting	2	2	0.58	1
Right-turn channelization island	2	2	Reduces conflict points	N/A
Signal Timing - Install countdown signals	1	1	0.45	2
Signal Timing - Leading pedestrian/bicyclist interval	1	1	0.63	2
Signal Timing - Modify left-turn phasing	1	1	Reduces conflict points	N/A
Vehicle turning movement restrictions	1	2	Reduces conflict points	N/A
Unsignalized				
Enhanced crossing treatment	1	2	0.58	2
Lighting	2	2	0.58	1
Reduce curb radii	2	2	Reduces speed	N/A
No Traffic Control				
Access control	3	3	0.75	1
Sidewalks	2	2	Reduces conflict points	N/A

Example Countermeasures – Bicycle

Crash Countermeasures by Area Type and Traffic Control	Relative Construction Cost	Relative Ease of Implementation	Countermeasure Effectiveness*	Relative Reliability of CMF
All Locations				
Signalized				
Bike detection	1	1	Accounts for human factors	N/A
Lighting	2	2	0.58	1
Pavement markings	1	1	Accounts for human factors	N/A
Right-turn channelization island	2	2	Reduces conflict points	N/A
Signal Timing - Leading pedestrian interval	1	1	0.59	2
Signal Timing - Modify left-turn phasing	1	1	Reduces conflict points	N/A
Vehicle turning movement restrictions	1	2	Reduces conflict points	N/A
Unsignalized				
Enhanced crossing treatment	1	2	0.58	2
Lighting	2	2	0.58	1
Reduce curb radii	2	2	Reduces speed	N/A
Skip Striping	1	1	Accounts for human factors	N/A
Supplemental signs and markings	1	1	Accounts for human factors	N/A
No Traffic Control				
Access control	3	3	0.75	1
Bicycle route signage	1	1	Accounts for human factors	N/A
Longitudinal bike stencil	1	1	Accounts for human factors	N/A

Implementation Plan

Content

- Prioritizes bicycle and pedestrian corridors for safety improvements
  - Risk-based prioritization for State Highways in urban areas
  - Traditional prioritization for all roadways (State and Non-State)
- Countermeasure Toolbox to assist in determining safety improvements

Implementation Plan

How does this plan help local agencies and ODOT regions?

- Local agencies can identify and propose candidate corridors with defined set of risk factors on their own roadway networks
- Region staff can prioritize candidate corridors
- Assists in allocating funding between state/local roads based on distribution of severe-injury and fatal crash locations and risk factors

Project Limitations

- Limited crash data
- Limited low-cost countermeasure options
- Inconsistent inventory data across jurisdictional boundaries
  - State
  - Non-state (City, County, MPO)
  - Portland METRO
- Not unique to Oregon
  - NCHRP Synthesis 458, Roadway Safety Data Interoperability Between Local and State Agencies

Improving the Plan

- Data Collection
  - A consistent problem throughout the project was data limitations:
    - Inconsistencies
    - Limited spatial coverage
    - Lack of desired detail
  - It would be best to indicate bicycle and pedestrian exposure using volumes
- Evaluation of Implementation Effectiveness
  - Evaluating the program will be critical for identifying problems and which countermeasures are most effective in which environments
- Enforcement and Education

Questions?

- Contact Us
  - Project team
    - Doug Bish, ODOT – douglas.w.bish@odot.state.or.us
    - Casey Bergh, Kittelson – cbergh@kittelson.com
    - Ashleigh Griffin, Kittelson – agriffin@kittelson.com
    - Matt Braughton, Kittelson – mbraughton@kittelson.com

Crash Analysis - Statewide Reported Bicycle Crashes (2007-2011)